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(54) Drive circuit.

(57) A drive circuit for an inductive load 10 includes a switching device 12 connected in series with the load and controlled by a constant frequency oscillator 16. The mark/space ratio of the signal supplied to the switching device by the oscillator can be varied in accordance with the output of a comparator 18 which compares the measured instantaneous value of the current flowing in the load with a calculated value of the current.

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"DRIVE CIRCUIT"

This invention relates to a drive circuit for an inductive load, the drive circuit being of the so-called constant frequency type and including a switching device connected in series with the load and a source of supply.

It is frequently necessary to control and vary the average current flowing in the inductive load and this can be achieved by varying the mark/space ratio. The difficulty arises in providing a measure of the average current since from the instant of switch on the current will increase exponentially in the load and if a flywheel diode is provided, from the instant of switch off will also decrease exponentially.

The object of the invention is to provide a drive circuit in a simple and convenient form.

According to the invention a drive circuit of the kind specified includes means for measuring the instantaneous value of the current flowing in the device at or after a predetermined time following switch on and means for comparing the measured instantaneous value of current with a calculated value of current, and further means for adjusting the mark/space ratio to achieve the desired average current flow in the load.

An example of a drive circuit in accordance with the invention is illustrated in the accompanying circuit diagram.

The drive circuit is intended to control the current flowing in an inductive load represented by the inductor 10, the inductive load being for example a proportional solenoid. One terminal of the load is connected to a d.c. supply line 11 and the other terminal of the load is connected by way of a switching device 12 and a resistor 13 connected in series, to the other supply line 14. The switching device may comprise a transistor. In addition, in parallel with the load 10 is a flywheel diode 15.

A constant frequency oscillator 16 is provided and this is connected to one input of a control circuit 17 the output of which controls the operation of the switching device 12. The control circuit also has an input which is connected to the output of a comparator 18 by way of an integrator 18A and one input of the comparator is connected by way of a switch 19 to a point intermediate the switching device 12 and the resistor 13. The other input of the comparator is connected to a reference source 20 and the operation of the switch 19 is controlled by the output of the oscillator 16.

In use, the control circuit 17 provides a square wave output signal to drive the switching device 12, the mark/space ratio being controlled by the output of the comparator 18 by way of the integrator 18A. The reference source 20 provides a voltage repre-

sentative of a desired instantaneous current to one input of the comparator and a voltage representing the actual instantaneous current in the load, is applied to the other input of the comparator by way of the switch 19 at the instant the switching device 12 is turned on or at a predetermined time after it has been turned on but before it is turned off. The voltage developed across the resistor 13 is representative of the instantaneous value of current and this is compared by the comparator 18 with the desired instantaneous value. Any deviation between the actual and desired value is corrected by adjustment of the mark/space ratio, the instantaneous value of the current being representative of the average current flowing in the load 10.

The reference voltage supplied by the source 20 is predetermined for given circuit conditions and any deviation of the circuit conditions tending to cause a variation in the average current flowing in the load 10 will be corrected by the circuit. For example, if the supply voltage should fall which would, in the absence of any correction, cause a reduction in the average current flowing, the mark/space ratio will be adjusted to cause the average current to be restored to the desired value.

The operation of the control circuit may be controlled by a micro-computer which from the feedback signal representing the instantaneous value of current in the load 10 can control the control circuit 12 to obtain the desired average current flow in the load 10.

**Claims**

1. A drive circuit for an inductive load the drive circuit being of the so-called constant frequency type and including a switching device connected in series with the load and a source of supply, characterised by means 13, 19 for measuring the instantaneous value of the current flowing in the device at or after a predetermined time following switch on, means 18 for comparing the measured instantaneous value of current with a calculated value of current, and further means 17 for adjusting the mark/space ratio to achieve the desired average current flow in the load.

2. A drive circuit according to Claim 1 characterised in that the means for comparing comprises a comparator 18 the output of which is supplied by way of an integrator 18A to said further means 17, the comparator having one input connected to a reference voltage source 20 which supplies a voltage representative of the calculated value of cur-

rent and a further input which receives a voltage representative of the measured instantaneous value of the current.

3. A drive circuit according to Claim 2 characterised by a resistor 13 connected in series with the load 10 and switch means 19 through which the voltage developed across said resistor is applied to said further input of the comparator 18.

4. A drive circuit according to Claim 2 including an oscillator for supplying a constant frequency signal, characterised by a control circuit 17 which receives said constant frequency signal and controls the operation of said switching device 12, the output of said integrator 18A being applied to said control circuit 17 to control the mark/space ratio of the signal applied to the switching device.

5. A drive circuit according to Claim 3 characterised in that switch means 12 is controlled by said constant frequency signal.

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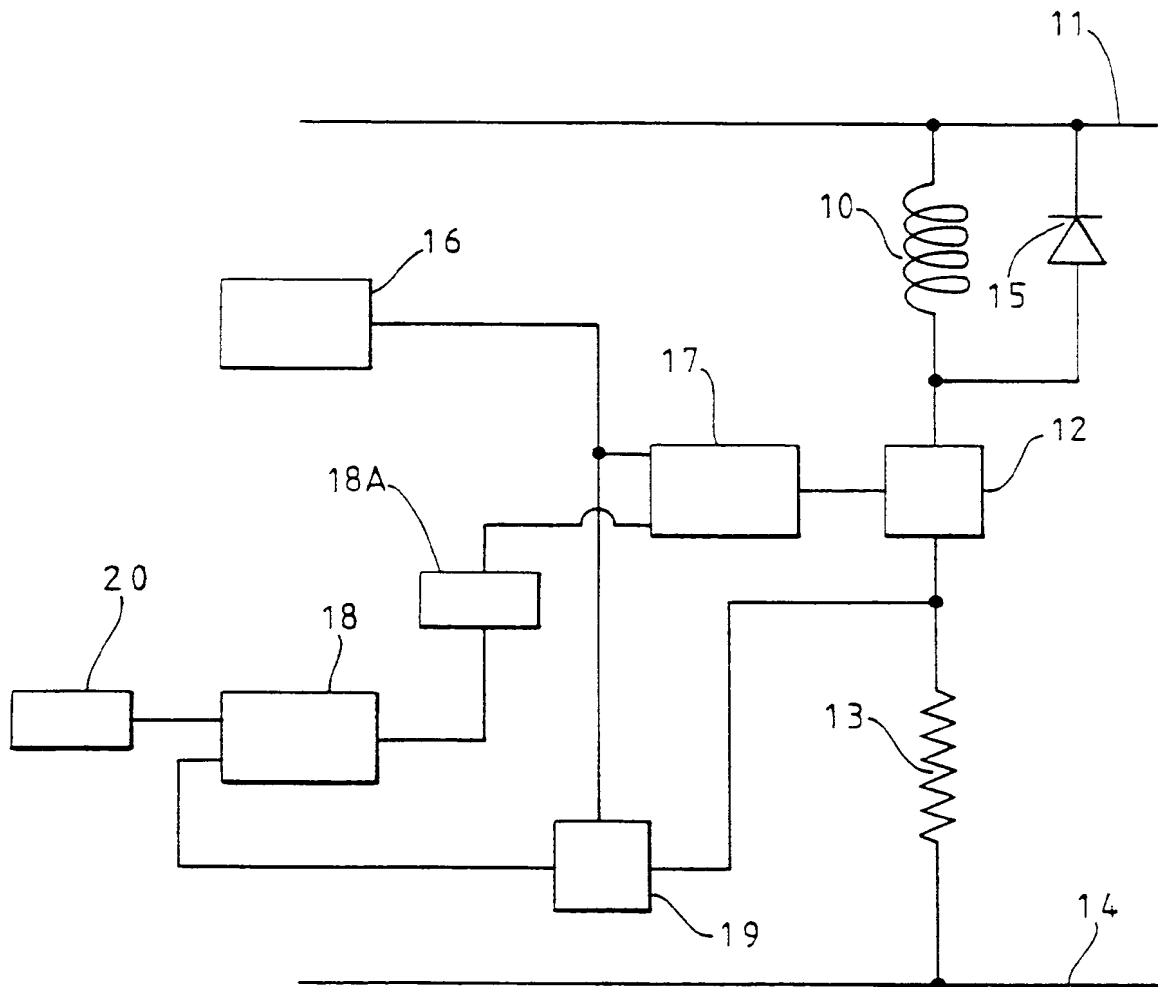
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# EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 87305525.5
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	<u>DE - A1 - 3 423 505</u> (SODECO-SAI A AG) * Abstract; fig. 1; claims 1-6 *	1-5	H 01 F 7/18
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A	<u>DE - A1 - 3 503 289</u> (LUCAS) * Abstract; fig. 1 *	1-5	
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A	<u>DE - A1 - 3 507 103</u> (FORD) * Abstract; fig. 2,3 *	1-5	
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			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			H 01 F 7/00

The present search report has been drawn up for all claims

Place of search VIENNA	Date of completion of the search 08-09-1987	Examiner VAKIL
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X : particularly relevant if taken alone		T : theory or principle underlying the invention
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P : intermediate document		& : member of the same patent family, corresponding document

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